



ICAO

International Civil Aviation Organization
North American, Central American and Caribbean Office

WORKING PAPER

ADS-B/OUT/M — WP/04
11/08/19

**Automatic Dependent Surveillance – Broadcast OUT Implementation Meeting for the
NAM/CAR Regions (ADS-B/OUT/M)
Ottawa, Canada, 21-23 August 2019**

**Agenda Item 2: Update Status ADS-B Implementation for States
2.2 Update ADS-B Status implementation and regulation development by
States**

ADS-B IMPLEMENTATION STATUS IN CENTRAL AMERICAN FIR

(Presented by COCESNA)

EXECUTIVE SUMMARY

This Working Paper presents the ADS-B implementation status in Central American FIR as part of the modernization strategy of the Aeronautical Surveillance Systems in the COCESNA and its Member States' Planning Framework, which is aligned with the Global Air Navigation Plan (GANP) and the Regional Plans to assure interoperability, technological homogeneity, and to cover the needs of the region aimed to obtain operational benefits, increasing capacity and efficiency in the Air Navigation Services in a cost-beneficial and secure manner.

Action:	Suggested actions are presented in Section 6.
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency
<i>References:</i>	<ul style="list-style-type: none">• Global Air Navigation Plan (GANP)• COCESNA Strategic Plan

1. Introduction

1.1 During the last five years COCESNA and its Member States have implemented an Investment Plan for the Modernization of the Air Navigation Systems, considering the Global Air Navigation Plan and the Implementation Regional Plans and adapting the needs of the region with an optimum cost-benefit to allow increasing the capacity and efficiency of the Air Navigation Services provided in the different airspaces of the Central American flight information region (FIR).

1.2 As part of this planning, the objectives and initiatives to update the Central American Surveillance was considered, highlighting the following: the modernization of the conventional radar technology systems with new cooperative technology contemplated in the Aviation System Block Upgrade - ASBU (Automatic dependent surveillance – broadcast [ADS-B], and Wide Area Multilateration - WAM).

1.3 As in other regions of the world, there is not a unique surveillance solution for the different environments of the Central American region, by which the use of conventional technologies integrated with the new systems must be considered to solve deficiencies in the lower levels of the Central American FIR airspace and the oceanic space.

1.4 The ADS-B is the next generation surveillance technology, able to replace the radar and to provide significant enhancements. However, additional efforts are still needed, including the development of the operational concept, the separation standards for all the airspace volumes and the avionics equipage to materialize in a proper way the ADS-B benefits.

1.5 For the technologies that are being introduced, it is essential that each implementation undergo a thorough process to demonstrate that it supports the agreements and operational procedures under an adequate cost/benefit relationship and assuring safety.

2 SURVEILLANCE SYSTEMS MODERNIZATION

2.1 In the planning and modernization of the systems the following objectives were established:

2.1.1 SUV 1.- Coverage optimization and modernization of conventional systems:

2.1.2 Five (5) radar systems with Conventional MSSR technology were updated to Mode S Systems with Digital Receptor and ADS-B capacity included for the main terminal control area (TMA) in the Central American airports.

2.1.3 SUV 2. – New aeronautical surveillance technology implementation:

2.1.4 Seven Mode S radars that were in their halfway life-cycle were updated with Digital Receptors with ADS-B reception included, which extended their life-cycle; all these with positive cost-benefit results.

2.1.5 The Automatic dependent surveillance - contract (ADS-C) in the Oceanic Space was implemented, an ADS-B receptor was installed in the Coconut Island in the Pacific Ocean and a WAM System in La Aurora, Guatemala, International Airport TMA, in the installation process.

2.1.6 Cost-benefit and the definition of the operation concept are being evaluated for the Satellite ADS-B implementation in the Oceanic airspace of the Central American FIR. Specifically, its implementation is considered in the Pacific Ocean area, which is complementary to the ADS-B coverage of the Coconut Island in those areas that are not reached by the radar network and by ADS-B installed in the continental platform.

2.1.7 Preliminary assessments, taking into account information of finalized air flight plans, show that around 90% of aircrafts that flight in the Pacific Ocean airspace have the required equipment to use satellite ADS-B and more than 70% have DO-260B.

2.1.8 SUV 3. - Aeronautical Surveillance Network Implementation

2.1.9 Migration of management and communication of data systems to an IP for the surveillance data sharing with all the Central American Control Centres to improve the channels of communication with the adjacent FIRs.

2.1.10 SUV 4. – Establishment of standards and of the ADS-B operation concept

2.1.11 Coordinated with the Member States, COCESNA, through its Technical Committee is working in the establishment of standards that are required for the ADS-B usage in the different airspaces.

2.1.12 SUV 5. – Continuous Evaluation of benefits, monitoring and control of the aeronautical surveillance systems.

2.1.13 Within this objective, a system to warranty the benefits of all the different conventional ground-based surveillance systems (MSSR-S, PSR) and non-conventional systems (ADS-B and WAM) has been implemented, which allows to continuously assess and publish in a Webpage the benefits regarding detection, precision, integrity, false targets, latency and accountability of the sensors and/or surveillance data.

2.1.14 Through the assurance of benefits of the surveillance systems, the security and efficiency of the air operations are reached.

2.1.15 Additionally, the development of a monitoring system of the avionics ADS-B capacity in the surveillance FIR, through ADS-B Asterix Cat 21, Edition 2.4, that are recorded permanently to extract information of the ADS-B, merit figures, latency, etc., is finalizing.

2.1.16 These systems allow monitoring the avionics capacity of the ADS-B aircrafts, allowing determining the number of aircrafts with ADS-B, version (MOPS), Figure of Merit (FoM) and other available information in the ADS-B data that allow complying satisfactorily the ICAO mandate of monitoring ADS-B capabilities.

3 ADS-B DATA SHARING AND INTEGRATION

3.1 Surveillance data sharing among Central American control centres and adjacent FIRs enhance surveillance coverage and contributes with the automatization of Air Navigation Services, allowing coverage overlapping and maximizing the availability of surveillance data.

3.2 Seven (7) Control Centres were updated: CENAMER in Tegucigalpa/Honduras, CENAMER backup in Ilopango/El Salvador and the APP Control Centres in Belize, La Aurora/Guatemala, Mundo Maya/Guatemala, San Pedro Sula/Honduras, Managua/Nicaragua and Juan Santamaría/Costa Rica, to integrate the ADS-B data in the last version of Asterix CAT 21, Edition 2.4, and processing according to the Figure of Merit to assure data processing complies with the required quality.

3.3 Implementation of an ADS-B server with the capacity to integrate 16 sensors for the integration of ADS-B data in the CENAMER backup and the CENAMER Control Centre was carried out. Additionally, symbology was uniformed in all the control centres for the processing of the different surveillance data.

4 DATA SHARING

4.1 To develop with more effectiveness and modernity any aeronautical surveillance system, it is required the participation of all the industry, that is airlines, airport operators, manufacturers, etc. The solution for optimizing the services and reduce airspace separations also needs the joint participation of the service providers in the adjacent and satellite spaces.

4.2 In the same way, it is required developing effectively a surveillance data sharing among the States to implement situational awareness and to improve safety. In this task, ICAO has a fundamental role and requires the adoption of measures to allow the promotion of this cooperation and sharing.

5 CONCLUSIONS

5.1 COCESNA and its Member States have an aeronautical surveillance system, formed essentially by conventional systems: MSSSR/Mode S radars, that are been updated to digital receptors, allowing the enhancement of its benefits, enabling ADS-B reception and providing a second surveillance layer with positive cost-benefit and reducing the exploration cost.

5.2 The main surveillance deficiencies are located at the south of the oceanic FIR, where radar coverage is not available, only ADS-C in lower levels out of the TMA, which provides flight information, due to the terrain orography.

5.3 It is estimated that with the satellite ADS-B implementation in the Pacific Ocean airspace it would be possible to reduce the longitudinal separation minimum between aircrafts in the same flight level with the same route, allowing aircrafts to manage more efficiently their altitude and reduce errors that are currently produced mainly on the fixed LIXAS in the FIR southeast, that acts as a funnel because of the great quantity of flights in that area. All the aforementioned will result in lower fuel consumption and in CO2 emissions reduction and, probably, would provide more direct routes.

5.4 There is not a unique solution for the current deficiencies, hence, the usage of conventional surveillance systems and new technologies (MLAT, ADS-B and ADS-C) or a combination of these are being considered, as is the case of La Aurora TMA where the first Central American WAM System will be installed, with ADS-B capacity in all the stations.

5.5 Surveillance enhancement and separation reduction of aircrafts in the Pacific Ocean airspace requires a joint solution with the adjacent air navigation service providers and the Satellite ADS-B providers, in such a way that all the users or the airspace can obtain a benefit.

5.6 To assure a prompt implementation of ADS-B technology, COOPERATION of all the civil aviation industry is necessary.

6 Suggested action

6.1 The Meeting is invited to:

- a) be aware of this Working Paper on ADS-B implementation in the Central American FIR.